Amendments to the Specification

Please replace the existing title with the following new title:

EVALUATION OF REFLECTED TIME-ENERGY PROFILE FOR EVALUATION OF OSSEOINTEGRATION AND DENSITY

Please replace paragraph **[0001]** with the following amended paragraph:

[0001] This application is a continuation-in-part of Application 10/671,002 (filed 25 September 2003), which claims the benefit of U.S. Provisional Application 60/414,691 (filed 27 September 2002), and U.S. Provisional Application 60/422,186 (filed 29 October 2002). The entire disclosure of ~~both~~ all of these priority applications is hereby incorporated by reference herein.

Please add the following new paragraphs after paragraph **[0017]**:

[0017.1] FIGURE 5 is a graph of loss coefficient as a function of panel dimension for a panel of damping material.

[0017.2] FIGURE 6 is a graph of loss coefficient as a function of damping layer depth in a panel of damping material.

[0017.3] FIGURE 7 is an exploded perspective view of an exemplary layered composite honeycomb material.

[0017.4] FIGURE 8 is a graph of loss coefficient as a function of panel core density for a damping panel having a woven fiberglass core with a phenolic impregnant.

[0017.5] FIGURE 9 is a graph of loss coefficient of a function of panel core density for a damping panel having a unidirectional carbon core with a phenolic impregnant.

Please add the following new paragraphs after paragraph **[0033]**:

[0033.1] The reflected time-energy profile provides information about the stability of the tooth or implant in the underlying anatomy. For example, in one embodiment an assessment of bone density of the bone surrounding the tooth or implant can be made based on an evaluation of the reflected time-energy profile. The bone density assessment can be quantitative or qualitative. In such embodiments, an assessment of bone density can provide an early indication of the stability of an implant shortly after implantation, and before significant osseointegration occurs. In other embodiments, the reflected time-energy profile is used to evaluate the health of the tooth or implant, as well as surrounding tissue, including the periodontal ligament and/or bone.

[0033.2] In accordance with the foregoing, it will be appreciated that the reflected time-energy profile can be used to assist in the diagnosis or assessment of a variety of medical conditions, including medical conditions related to the dental anatomy. For example, the reflected time-energy profile can be used to assist in the diagnosis of trauma-induced tooth fractures and of bone loss due to abscesses. Likewise, the results of bone augmentation surgeries can be assessed in a similar manner.

Please replace paragraph **[0034]** with the following amended paragraph:

[0034] The foregoing examples illustrate that analysis of the time-energy profile of a dental structure can provide information about the integrity and stability of that structure. The term "dental structure" is used broadly in this context, and refers to natural teeth and prosthetic implants, as well as the bone and ligament structures that anchor such objects within the human body. These analysis techniques provide clinicians with an accurate, fast and simple tool that provides information on the stability of natural and prosthetic dental structures without requiring an invasive procedure. In other embodiments, the integrity and stability of other medical devices and anatomical structures, such as orthopedic implants and prosthetic implants, can be evaluated based on an assessment of a reflected time-energy profile.

Please replace paragraph **[0038]** with the following amended paragraph:

[0038] As an example, layered honeycomb structures generally have a relatively high damping capacity, and thus are often used as acoustic insulators in these fields. An exemplary layered honeycomb composite structure 160 is illustrated in FIGURE 7. ~~Typical~~ The exemplary layered honeycomb composite structure 160 includes one or more ~~structures have two~~ relatively thin facings 162 that have high strength and stiffness. The facings enclose a honeycomb core structure 164 that is relatively thick, but lightweight and with high strength in the direction perpendicular to the facings. For example, the honeycomb core structure 164 can comprise a Nomex® honeycomb core, available from E.I. du Pont de Nemours and Company (Wilmington, Delaware). The facings 162 and the core 164 are generally bonded together, either mechanically or with adhesives (such as, for example, with a phenolic resin), thus giving the structure 160 composite properties. In the composite structure 160, the facings 162 carry bending stresses, while the core 164 carries shear stresses. When exposed to acoustic vibrations for a prolonged period, degradation in the bonds between the layers, as well as in the honeycomb core 164 itself, can cause a layered honeycomb core structure 160 to have diminished acoustic insulation capacity.

Please add the following new paragraphs after paragraph **[0038]**:

[0038.1] As illustrated in FIGURE 7, the composite structure 160 optionally includes an inner damping core 166 incorporated into the honeycomb core structure 164. While inclusion of the damping core 166 can increase the weight of the composite structure 160, it can cause a significant increase in the damping capacity of the composite structure 160. For example, in one embodiment, addition of the damping core 166 to the composite structure 160 increases the damping capacity of the composite structure by approximately 65%. In a modified embodiment, the damping core 166 is selectively included in the composite structure 160, such that vibration

isolation can be targeted to a particular portion of the composite structure 160 without significantly increasing the weight of the composite structure 160.

[0038.2] In addition to having a relatively high damping capacity, honeycomb structures, including layered honeycomb structures offer several other advantages. For example, such structures generally have a high strength to weight ratio, are resistant to corrosion, and can be configured to be electrically conductive or insulating, depending on the requirements of a particular application. Furthermore, these structures can be made fire resistant by using an appropriate resin and can be molded into complex shapes.

Please replace paragraph **[0041]** with the following amended paragraph:

[0041] The testing apparatus illustrated in FIGURE 4 can be used to evaluate the damping capacity of a wide variety of materials, including structures used for damping, shock absorbance, and impact resistance. For example, in one application, this apparatus can be used to evaluate the damping capacity of layered honeycomb composite specimens. In such an application, the specimen 114 to be tested is mounted in the angle vise 154, which is tightened using the vise drive 156 to a torque of approximately 2765 g·cm, although in other embodiments, the specimen 114 can be loaded to a different torque. In other embodiments, the testing apparatus can be configured to evaluate other materials, such as electronic packaging materials and other electronic components.

Please add the following new paragraphs after paragraph **[0044]**:

[0044.1] The percussion instruments described herein can be used with the testing apparatus illustrated in FIGURE 4 to characterize the damping characteristics of a wide variety of damping materials, including layered honeycomb materials. For example, relationships between certain properties of the materials and the damping coefficient of the materials can be ascertained. For example, FIGURE 5 illustrates the relationship between the dimensions of a substantially square panel having a layered

honeycomb structure, and the loss coefficient of the panel. As evident from this graph, smaller panels generally have higher loss coefficients, and thus dissipate the energy of an elastic wave relatively quickly. Conversely, larger panels generally have lower loss coefficients, and thus dissipate the energy of an elastic wave relatively slowly. Therefore, increasing the dimensions of a square panel of damping material decreases the damping effect produced by the panel.

[0044.2] As another example, FIGURE 6 illustrates the relationship between the depth at which the inner damping core 166 is embedded within the layered honeycomb panel and the loss coefficient of the panel. Generally, the depth at which the inner damping core 166 is embedded within the layered honeycomb panel is the distance between the damping core 166 and the tapping rod 102 impact point. As evident from this graph, panels with deeply embedded damping cores generally have lower loss coefficients, and thus dissipate the energy of an elastic wave relatively slowly. Conversely, panels with shallowly embedded damping cores generally have higher loss coefficients, and thus dissipate the energy of an elastic wave relatively quickly. Therefore, moving the damping core 166 closer to the source of vibrational energy increases the damping effect produced by the damping core 166.

[0044.3] The damping coefficient can also be affected by the weight density of the core materials disposed within the layers of a composite damping panel, such as the composite panel illustrated in FIGURE 7. The loss coefficient of composite panels having varying weight densities can be tested using the apparatus of FIGURE 4. For example, FIGURE 8 illustrates the relationship between loss coefficient and core weight density for composite damping panels having a 25 mm woven fiberglass core with a phenolic impregnant. Similarly, FIGURE 9 illustrates the relationship between loss coefficient and core weight density for composite damping panels having a 25 mm unidirectional carbon core with a phenolic impregnant. As evident from these graphs, panels having an inner core with a greater weight density generally have lower loss coefficients, and thus dissipate the energy of an elastic wave relatively slowly. Conversely, panels having an inner core with a reduced weight density generally have higher loss coefficients, and thus dissipate the energy of an elastic wave relatively

quickly. Therefore, decreasing the weight density of the inner core of a damping panel increases the damping effect produced by the panel.

[0044.4] The foregoing provide examples of how a variety of damping panel properties are related to the damping coefficient of such panels. In other embodiments, other properties can be correlated to the panel damping coefficient. Examples of such other properties include, but are not limited to, panel surface area, overall panel thickness, number of layers, and panel composition.